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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

**Office Action Summary****Application No.**

10/583,336

**Applicant(s)**

SAKURAI, TETSUO

**Examiner**

TRANG Q. TRAN

**Art Unit**

2811

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 8/13/2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-3, 6, 7 and 9-23 is/are pending in the application.
- 4a) Of the above claim(s) 9 and 10 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3, 6, 7 and 11-23 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB-08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Claim Objections***

Claim 16 is objected to because of the following informalities: "the difference in the height", as recited in claim 6. Appropriate correction is required.

Claims 19 and 21-23 are objected to because of the following informalities: "difference in height". Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 15 and 18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Re. claims 15 and 18, the recited limitation of "the thickest portion of the first layer" is unclear as to which portion the applicant refers.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claims 1-2 and 6-7 and 11-12** are rejected under 35 U.S.C. 103(a) as being unpatentable over Ota et al. (6,442,184) in view of Steigerwald et al. (2004/0113163).

**Re. claim 1**, Fig. 3 of Ota discloses a Group III nitride semiconductor device comprising a substrate (1+2), and a plurality of Group III nitride semiconductor layers (as seen in Fig. 1) provided on the substrate (11), wherein a first layer (3) which is in contact with the substrate (1+2) is composed of  $\text{Al}_x\text{Ga}_{1-x}\text{N}$  and has a structure formed of aggregated columnar crystal grains (as seen in Fig. 3).

Ota may not explicitly teach the following limitations whereas Fig. 2C of Steigerwald teaches it is known in the art to provide a first layer is composed of silicon-doped  $\text{Al}_x\text{Ga}_{1-x}\text{N}$  ( $0 < x \leq 1$ ) (ref. no. 37, ¶13 of Ota teaches the first layer (37) is AlGaN layer with an Aluminum composition between about 50% to 100% and is doped with Silicon) and has a structure formed of columnar crystal grains having a width of 0.06 micron.

It would have been obvious to one of ordinary skill in the art at the time of invention was made to provide the composition of the first layer of Steigerwald in Ota, in order to scatter light out of the device (¶14 of Steigerwald).

However, Ota and Steigerwald may not teach columnar crystal grains having a width of 10 to 50 nm.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide certain measurement, since it has been held that discovering the optimum or workable ranges involves only routine skill in the art. *In re*

*Aller*, 105 USPQ 233; *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980); *In re Huang*, 100 F.3d 135, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996).

**Re. claim 2**, Ota and Steigerwald disclose the Group III nitride semiconductor device according to claim 1, Ota and Steigerwald may not explicitly teach wherein the first layer contains silicon in an amount of  $1 \times 10^{17}/\text{cm}^3$  to  $1 \times 10^{17}/\text{cm}^3$ .

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to provide the first layer contains silicon in an amount of  $1 \times 10^{17}/\text{cm}^3$  to  $1 \times 10^{17}/\text{cm}^3$  because it is a standard doping for Silicon.

Generally, differences in concentration do not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration is critical. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller*, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955). See also *In re Hoeschele*, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969). For more recent cases applying this principle, see *Merck & Co. Inc. v. Biocraft Laboratories Inc.*, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), *cert. denied*, 493 U.S. 975 (1989), and *In re Kulling*, 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990).

**Re. claim 6**, Ota and Steigerwald disclose the Group III nitride semiconductor device according to claim 1, Ota and Steigerwald discloses the wherein the first layer

has a certain thickness. However, Steigerwald and Ota may not explicitly teach the first has the thickness of 20 nm to 200 nm.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide certain measurement, since it has been held that discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233; *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980); *In re Huang*, 100 F.3d 135, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996).

**Re. claim 7**, Fig. 1 of Ota discloses a Group III nitride semiconductor light-emitting device comprising a substrate (1+2); an n-type layer (4+5), a light-emitting layer (6), and a p-type layer (8), which are composed of a Group III nitride semiconductor single crystal (3) and are provided on the substrate (1+2) in this order; a negative electrode (¶ 168) provided on the n-type layer (4); and a positive electrode (¶ 168) provided on the p-type layer (18), wherein there is a layer (3) composed of  $s \text{ Al}_x\text{Ga}_{1-x}\text{N}$  in contact with the substrate (1+2) has a structure formed of aggregated columnar crystal grains (as seen in Fig. 3).

Ota may not explicitly teach the following limitations whereas Fig. 2C of Steigerwald teaches it is known in the art to provide a first layer (37) in contact with the substrate (32+35) is composed of silicon-doped  $\text{Al}_x\text{Ga}_{1-x}\text{N}$  ( $0 < x \leq 1$ ) (¶ 13, Ota teaches the layer (37) is AlGaIn layer with an Aluminum composition between about 50% to 100% which is  $0.5 \leq x \leq 1$  and is doped with Silicon) and the first layer (37) in contact with

the substrate (32+35) has a structure formed of columnar crystal grains having a width of 60 nm.

It would have been obvious to one of ordinary skill in the art at the time of invention was made to provide the composition and width of the first layer of Steigerwald in Ota, in order to scatter light out of the device (§14 of Steigerwald).

However, Ota and Steigerwald may not teach columnar crystal grains having a width of 10 to 50 nm.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide certain measurement, since it has been held that discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233; *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980); *In re Huang*, 100 F.3d 135, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996).

**Re. claims 11 and 12**, Ota and Steigerwald disclose the Group III nitride semiconductor device according to claim 1 and 7, Steigerwald further discloses wherein the first layer (37) is composed of silicon-doped  $\text{Al}_x\text{Ga}_{1-x}\text{N}$  ( $x$  is between about 50%-100%,  $0.5 \leq x \leq 1$ ).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide certain claimed ranged of aluminum composition, since it has been held that discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233; *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980); *In re Huang*, 100 F.3d 135, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996).

**Claims 3, and 15-23** are rejected under 35 U.S.C. 103(a) as being unpatentable over Ota et al.

**Re. claim 3**, Fig. 1 of Ota discloses a Group III nitride semiconductor device comprising a substrate (1+2), and a plurality of Group III nitride semiconductor layers (3+4) provided on the substrate (10), wherein a first layer (3) which is in contact with the substrate (1+2) is composed of  $Al_xGa_{1-x}N$  (Col. 4, lines 56-68).

Ota teaches a difference in height between a protrusion and a depression which are present at the interface between the first layer and a second layer (as seen in Fig. 3), however Ota may not explicitly teach the difference in height between a protrusion and a depression which are present at the interface between the first layer and a second layer provided thereon is 10 nm or more and is equal to or less than 99% the thickness of the first layer.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the claimed range of the difference in height between the protrusion and the depression, since it has been held that discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233; *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980); *In re Huang*, 100 F.3d 135, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996).

**Re. claims 15-23**, Fig. 3 of Ota teaches a certain dimension of the first layer (3), and the difference in height of the protrusion (maximum protrusion) and the depression



(maximum depression). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the ranges as claimed, since it has been held that discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233; *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980); *In re Huang*, 100 F.3d 135, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996). Claims 15-23 rejection under the same reasons as claim 3 rejection.

#### ***Response to Amendment***

Applicant's amendment to the claims, filed on April 23, 2008, is acknowledged. Entry of amendment is accepted and made of record. Currently, claims 1-17 are pending in light of the amendment, in which: claims 1, 7 and 9 were amended; claims 4-5 and 8 were cancelled; claims 9-10 were withdrawn; and claims 11-12 were added.

#### ***Response to Arguments/Remarks***

Applicant's response filed on November 20, 1008 is acknowledged and is answered as follows.

Applicant's arguments, see pg 6, Applicant argues that the prior art fails to teach the crystal grains having a width of 10-50 nm. This argument is not persuasive since it has been held that a change in dimension of the semiconductor device is generally recognized as being within the level of ordinary skill in the art. In *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S.

830, 225 USPQ 232 (1984), the Federal Circuit held that, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device.

Applicant's arguments, see pgs. 7-8, with respect to the rejection that "nothing in Ota teaches or fairly suggests the unique relationship of the difference in height between a protrusion and a depression which are present at the interface between the first layer and a second layer provided thereon is 10 nm or more and is equal to, or less than, 99% the thickness of the first layer." This argument have been fully considered but they are not is not persuasive since it has been held that a change in size or dimension of the semiconductor device is generally recognized as being within the level of ordinary skill in the art. In *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984), the Federal Circuit held that, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device.

In view of the foregoing reasons, the Examiner believes that all Applicant's arguments and remarks are addressed. The Examiner has determined that the previous Office Action is still proper based on the above responses. Therefore, the rejections are sustained and maintained.

***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **TRANG Q. TRAN** whose telephone number is (571)270-3259. The examiner can normally be reached on **Mon - Thu (9am-5pm)**.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, **Lynne A. Gurley** can be reached on **571-272-1670**. The fax phone number for the organization where this application or proceeding is assigned is **571-273-8300**.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/T. Q. T./  
Examiner, Art Unit 2811  
/Cuong Q Nguyen/  
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